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Translation

USSR SCIENCE AND TECHNOLOGY POLICY

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USSR SCIENCE AND TECHNOLOGY POLICY

This non-serial report contains selected translations of Russian articles on the planning and administration of Soviet science and technology.

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LEGAL MECHANISM OF A SINGLE POLICY FOR THE DEVELOPMENT OF SCIENCE AND TECHNOLOGY

Moscow SOVETSKOYE GOSUDARSTVO I PRAVO in Russian No 4, 1980 pp 93-100

[Article by V. P. Rassokhin*]

[Text] The Central Committee of the CPSU and the USSR Council of Ministers decree "On improving planning and strengthening the effect of the management mechanism on increasing the efficiency of production and improving the quality of work" of 12 July 1979, specifies as the central problems of the USSR Gosplan and other organizations, called upon to guide the development of the national economy, the duty to provide a comprehensive solution to economic and social problems, concentrate the forces and resources on fulfilling the most important general government programs and not permit a narrow-industrial approach to developing plans.** In our opinion, a necessary condition for the successful solution of this important problem is the creation of a special legal mechanism to carry out a truly single government scientific-technological policy, not "corrected" by the influence of department interests.

Lack of existing legal regulation. Many principal problems that must have legal solutions remain beyond the boundaries of legal regulation in the area of scientific-technological progress. They include, for example, the following: the creation of an efficient system of mutual relationships between the USSR Academy of Sciences and the industrial sectors of the national economy and the determination of the rights of the USSR Academy of Sciences as a coordinator of scientific work in the country according to the decrees of the 25th party congress; the development of an efficient legal organization mechanism that would provide for the carrying out of a single scientific-technological policy capable of overcoming the negative consequences of the departmental comminution in the national economy; the creation of organizational forms of interindustrial cooperation in science

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**See SP [Collection of Laws] USSR, 1979, No 18, p 118.

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and efficient solutions of interindustrial scientific technological problems; the establishment of an order to resolve differences of opinion in the system, and on the rights of the main industrial institutes for the purpose of eliminating the monopoly of the main institute of the producer industry as one of the factors that retard scientific-technological progress; the establishment of an order to introduce the results of completed investigations and developments, especially the legal mode of technological development and the introduction of new in principle achievements of science and technology capable of revolutionizing production; a clear determination of the legal forms of the actual responsibility of scientific organizations; production enterprises and their managers for the nonfulfillment of tasks of government plans on developing science and technology, especially those specified by the comprehensive programs for solving basic scientific-technological problems.

Sometimes attempts are made to replace the general solution of many important problems by "ad hoc" legal regulations, i.e., regulating these relationships as exceptions only for particular, individually taken cases. Typical examples of "ad hoc" regulations are solutions adopted for several legal organizational problems to carry out a single policy in the development of electrical welding, in the area of developing and using new catalysts and in the coordination of investigations in the metal corrosion problems.*

The lack of forms of real responsibility in the area of organizing investigations, developments and the introduction of their results leads to the fact that even the concrete norms of an imperative nature are not always implemented, without any consequences to establishments and managers who are formally responsible for their implementation. Thus, the direct specification of subpoint "b" of section 5 in the decree of the Central Committee of the CPSU and the USSR Council of Ministers "On measures for increasing the efficiency of the work of scientific organizations and accelerating the utilization of achievements of science and technology in the national economy" of 24 September 1968, "to provide in the highest priority, work specified by the coordination plans on solving basic scientific-technological problems, necessary financial and material equipment resources" is frequently found to be unfulfilled.** After changing over from a coordinated plan system to a comprehensive scientific-technological program system, several additional measures of an operational nature are being undertaken in order to achieve the observance of this norm. However, so far, no organizational legal mechanisms have been

*See: 25th party congress and further development of the Soviet Government, democracy and law, Moscow, 1977, p 136.

**See: SP USSR, 1968, No 18, p 122.

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created that would include compulsory forms of responsibility and guarantee absolute implementation of the indicated instruction, as well as other most important norms, determining the order of carrying out work on solving the basic scientific-technological problems.

One of the most serious shortcomings of legal norms concerning the most acute problem of introduction is the fact that they are basically oriented only toward establishing these or other duties of scientific organizations in the process of introducing the results of investigations and developments and almost do not touch upon the actual system of obligations--the interest and responsibility of production associations, enterprises and their managements. And yet, of course, it is needless to say that introduction cannot be implemented in any different way except as a two-way process of contacts between science and production. This elementary general truth for some reason is rarely accompanied by stressing another, considerably more important and concrete truth: the center of gravity of the introduction problem lies not in the area of obligations of science, but in the area of the obligations of production. Yet, until now, basic attention in discussing the problem is paid not to the central key problems of introduction, but to the obligations of scientific organizations and their workers to find further possibilities and strengthen the demands on them. For these purposes, it is proposed, for example, to introduce an indicator for the introduction of the results of investigations and developments as almost a main indicator of planning and evaluating the activity of scientific workers, not only in industrial, but also in academic institutes. It is not difficult to imagine where the introduction of such an indicator will lead that does not depend on the creative abilities or the activity of the scientific worker for the production facility (interested primarily in the stable output of a well assimilated product in constantly increasing volume and its gradual, small "dosage" modernization that does not affect the basic technological principle).

Of course, the scientific collective or individual scientist who created the original large invention will strive to do everything possible to have the invention introduced in practice without any "indicators." The legal conditions must provide for the use of the creative efforts according to their function, namely, to solve inevitable truly scientific-technological problems that originate in the process of introduction. Regrettably, the well-known principle--each one mind his own business and carry full responsibility for it--strange as it may seem, is not taken into account when they speak of the introduction problem. The slant to the "side of science" in the legal regulation of the introduction process of its achievements--is one of the most important efficient factors because of which the introduction problem remains very far from being solved until now. They turned, regrettably, to the most "popular" problem among scientists who attempt to "introduce" into production the achievements of modern science and technology and frequently meet serious opposition from enterprises as well as from departments themselves.

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Legislative basis of a single scientific-technological policy. The goals of interindustrial coordination in the development of science and technology may be achieved only when the coordination has a nature not of simple concordance fully dependent on the coincidence of departmental interests, but actual legal authority based on the highest national economic interest and not reduced to achieving a compromise between departments. Under the conditions of the industrial structure of manufacturing, any scientific-technological policy is, in practice, no different from the operational activity of industrial scientific organizations, associations and enterprises. However, the determination of the basic directions of the technological development of an industry must not remain the prerogative of scientific organizations and departmental management organs of the industry itself. This contradicts the principles of a systematic approach, the meaning of a single government scientific-technological policy, the objective requirements of an interindustrial integration in the development of economics, and the interests of a broad-scale introduction of the fundamental achievements of science and technology. The determination of the direction of the technological development of an industry is, in the final account, nothing less than the policy of introducing the achievements of science and technology, and it began long before the stage of introducing them and is based on decisions adopted at considerably higher--general industrial and general government--level under the general influence of fundamental science.

The significance of the problem posed is such that they can be solved only on a legislative basis. This basis may be a law on a single scientific-technological policy in the national economy. It must establish clearly, in the first priority, a distribution of competences at all levels of carrying out a general government scientific-technological policy based on the absolute priority of the national economic interests over departmental-industrial interests. As is well known, the more general, basic questions of a long-range nature are decided by the USSR government by issuing decrees. Its competency in this area is fixed by the Law on the USSR Council of Ministers. However, as far as the order of making decisions on concrete questions and constant activity of carrying out the scientific-technological policy is concerned, it is precisely here that it is necessary to introduce legal-organizational forms that guarantee the general government orientation of this entire activity. In an article, "On entrusting legislative functions to the Gosplan," V. I. Lenin expressed his idea on the feasibility of strengthening the special competence of such a central government establishment and conferring on it the authority to carry out directly the policy of the government in scientific-technological questions because it "as a totality of skilled men, experts, representatives of science and technology has essentially the greatest amount of data to judge correctly the matter" and its known independence "is absolute from the viewpoint of the authority of this scientific establishment...*

*Lenin, V. I. Complete Works, v 45, pp 349, 352.

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In what form can Lenin's idea on combining the highest scientific competency with imperative functions be implemented under modern conditions? In our opinion, in the area of a scientific-technological policy, the establishment of the combined authorities of the USSR Gosplan, the USSR Government Committee on Sciences and Technology and the USSR Academy of Sciences may serve as such a form. Most of the important questions of a single scientific-technological policy can be decided completely in their joint decrees while the monitoring of their implementation should be entrusted to the Government Committee. Transferring the center of gravity of the whole system of a single scientific-technological policy to the joint competency of the USSR Gosplan and the USSR Government Committee on Science and Technology would correspond to the regulation on the Law of the USSR Council of Ministers in which the functions of the USSR committees are clearly fixed as organs of the government itself. Conferring an imperative nature on decisions suggested by the USSR Academy of Sciences would become the legal implementation of the directives of the 25th party congress on raising the role of the USSR Academy of Sciences as a coordinator of scientific work in the country. In this case, the coordination of tasks specified in joint decrees with departments should not have juridical significance. The planned tasks established by the decrees must have an indisputably absolute nature for the ministries and departments. Experience has shown convincingly that coordination as a juridical act (and not as a method for an all-sided account of opinions) serves in the hands of the departments as the main legal instrument for imposing the factual priority of industrial-departmental interests. From this viewpoint, industrial scientific research institutes, design bureaus and enterprises should have the role of executors of imperative decisions developed on the general government level. It is also important to implement the same principle at other levels of carrying out the single scientific-technological policy. The major part of the concrete questions of an interindustrial nature cannot be handled at the level of joint decrees by the USSR Gosplan, the USSR Government Committee on Science and Technology and the USSR Academy of Sciences. Such questions, depending upon their complexity and importance, could be placed within the competency of interindustrial scientific-technological centers of this committee on academic institutes--in accordance with the legal model of authorities assigned to the Electric Welding Institute imeni Ye. O. Paton.* The remaining questions of an interindustrial nature would be within the competency of the main institutes of industrial consumers. The establishment of such a system for redistributing rights would make it possible to solve all the problems of interindustrial significance at all levels on the basis of objective national economic interests. Such a system would be a concrete legal implementation of regulation article 26 of the USSR constitution on general government guidance of the development of science and technology and the introduction of their achievements in the national economy.

*See: 25th party congress and further development of Soviet Government, democracy, p 136.

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In the law it is feasible to establish the order of carrying out the work on comprehensive programs for solving basic scientific-technological problems which would guarantee their full and timely implementation. The lack of such an order makes it impossible to use efficient methods and forms of target-program control of scientific-technological progress; it still remains an idea from the region of "pure reason," despite the development and adoption of the most comprehensive programs. Many proposals have been made in this regard by economists and scientists and they should be coordinated and utilized. Apparently an efficient legal form of organizing work by basic scientific-technological programs could be by assigning compulsory nondepartmental orders to interindustrial scientific-technological centers. This form may be similar to the already tested form of intraministerial orders already being used successfully, for example, in the electrical equipment industry. However, the system of nondepartmental orders must rely on the cardinal solution of the problems of responsibility of industrial organizations for untimely fulfillment or poor quality of the work ordered as specified by the program; otherwise it will remain only a form of the well-known impotent-recommendation nature.

The most important problem of promoting along the entire "introduction front" the new in principle achievements of science and technology that would revolutionize production also requires a special legislative solution. Attempts to solve the introduction problem on the basis of establishing a similar legal mode for all scientific-technological results independently of the level of their newness and importance to the national economy, cannot be efficient. Strictly speaking, this situation is characteristic of today (if one could detect the existence of an actual "introduction mode" at all). The existing legal norms do not differentiate between the introduction of objects no matter how sharply they differ from each other with respect to the importance of the input into scientific-technological progress. For example, all inventions recorded in the government register have the same legal position from the point of view of the possibilities of adopting decisions for their practical implementation in the national economy. It is well known, however, that the bigger the invention, the more difficult its road to production. The diffusion of new in principle, truly fundamental achievements in the total mass of scientific research, inventions and rationalized proposals contradict the objective requirements of the scientific-technological revolution.

Apparently, the law on the single scientific-technological policy should establish a priority, privileged mode--legal, economic and organizational --for introducing especially important achievements of science and technology into the national economy. It should be specified in particular that; expert government (nondepartmental) evaluation and recognition of the scientific-technological results especially important to the national economy (decision on this are adopted jointly by the USSR Committee on Science and Technology and the USSR Academy of Sciences; separation of a special legal category of especially important inventions for the national economy and applying the proposed priority mode to them; order of high

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priority inclusion of achievements of science and technology, recognized as especially important, in comprehensive programs and plans of scientific-technological progress; a system of the highest material awards to enterprises and scientific organizations for the creation and introduction of pioneering equipment and technology, with full replacement of losses incurred in their production and use during the initial period: the obligation of the author to supervise the work of creating and introducing pioneering equipment and technology, developed on the basis of achievements recognized as especially important to the national economy.

It is important to set by law the monitoring functions of the USSR Government Committee on Science and Technology. The 12 July 1979 decree of the Central Committee of the CPSU and the Council of Ministers specifies the strengthening of its rights with respect to departmental-industrial organizations. For example, the Government Committee is assigned the right to evaluate and monitor the technical level of the industrial production. The evaluation of the results of the work of industrial organizations could become an efficient tool for providing a single scientific-technological policy. However, this must be done, not by departmental commissions, but by independent expert ones. Such an evaluation could be made once every five years and by no means limit itself with quantitative indicators. It is worthwhile to recall the many years of the concept of the scientific reputation of scientific research institutes and design bureaus. It should be laid precisely at the basis of the conclusions of nondepartmental expert commissions. The Government Committee should be given the right, based on the conclusions of such commissions, to decide on the question of liquidating and reorganizing institutes and design bureaus that have a low scientific potential subordinated to departments.

It is extremely important that there be a radical solution to the problem of the responsibility of organizations, enterprises and their managers for unfulfilled obligations which were established by various legal prescriptions in the area of carrying out a single scientific-technological policy. However, so far there is practically no real responsibility in this area. Above we spoke about the necessity of strengthening the monitoring of functions of the government committee for the purpose of periodical improvement in the very structure of industrial science. The system of efficient, continuous responsibility in the given area could be realized if the committee were given the right to do the following: the right to transfer temporarily (3 to 5 years), to a lower category, scientific and planning-design organizations that systematically under-fulfill tasks specified by the single scientific-technological policy; the right to stop paying bonuses to managers of enterprises and organizations that do not fulfill such tasks; the right to exact (in the form of fines, according to the decision of government arbitration) estimated monies already spent for work not resulting the introduction, due to the laxity of the enterprise or scientific-technological organization, with the payment of these funds to go to the reserve fund of the committee.

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It is also necessary to introduce a special procedure to consider, in the USSR People's Control Committee and republic committees, matters on holding concrete management personnel responsible for unfulfilled tasks in the area of a single scientific-technological policy (for example, establish an order according to which people's control commissions make decisions on financial deficits and other administrative penalties on transaction material prepared by the USSR Government Committee on Science and Technology).

New contract form. In recent years, there has been great and greater necessity to change over to long-term relationships with the goal of solving large problems and the fullest utilization of the scientific potential of academic institutes and VUZ, for example, by concluding long-term contracts on cooperation between them and large enterprises, associations or technical administrations of ministries. A typical contract on carrying out scientific research, experimental design and technological work is a legal form adapted only to regulating the relationships of the contract type which are composed in the process of solving individual technical problems, originating basically in the course of the current productive activity of industrial enterprises. It does not cover specific relationships formed in connection with the solution of large comprehensive problems.

The principal features of the relationships, originating on the basis of cooperative contracts between academic institutes (VUZ) and large enterprises (associations) are their long-range nature and the absence of frameworks of one technical program. The main juridical difference between such contracts and the industrial type of contract is the lack of the strict division of subjects into pure "executor" and pure "client." The plant in such a relationship is a customer for technical documentation and is an executor of experimental work needed by the institute for further development of investigations. The initial basis for posing new in principle technical problems are not the current production needs of enterprises, but the long-range goals of technical development determined by science itself. The enterprise selects, from the experimental developments of the institute, those novelties which it is capable of putting into production in the very near planning period. Moreover, unlike the usual economic contracts for fulfilling scientific research and experimental-design work, cooperative contracts are more often of a multisided nature.

Thus, a new type of contract originates which still has not received a precise juridical name in literature or a definition of its legal nature. In practice it is named frequently a contract on socialist cooperation, inasmuch as it is based on counterplans for socialist obligations and is concluded "on social initiation" without juridical support in existing legislation. Sometimes it is called a "general contract"--in those cases where it represents a summary of mutual long-term obligations of an

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academic scientific center (combining several institutes) and enterprises of an industrial ministry. It is signed by the directors of all participating organizations and is approved by the minister and the manager of the academic center. The name of the new type of contract does not reflect the legal nature of those relationships that originate on "social initiations" in the course of the development of ties between science and manufacturing in important directions of the scientific-technological revolution. This is entirely natural--practice cannot juridically qualify relationships not even mentioned in the legislation.

An analysis and correlation of the features of the originating system of contract ties between science and manufacturing make it possible to conclude that they are not different from cooperative relationships. Cooperation contracts are widely used in international scientific-technological cooperation; however, they were not reflected in our internal legislation that regulates the ties between science and manufacturing. Proprietary relationships formed in the process of scientific-technological cooperation differ in principle from relationships in the industrial contract type and belong, apparently, to the type of contract relationships of a partnership (also not being generally regulated in existing civil legislation).

It should be noted that in developing the urgently needed legislation for formulating a contract system for long-term cooperation between science and manufacturing, one should not borrow directly the already formulated norms for international scientific-technological cooperation. This applies not only to the specifics of international scientific-technological cooperation. In such contracts, used by the CEMA countries, for example, there is no "client" not only in the juridical, but also in the economic sense; the obtained result is utilized by all contracting sides equally.* Contracts on creative cooperation always indicate, at least from the economic position, the basic client--he is on the manufacturing side. However, the complexity of the developing system of contract relationships for long-range cooperation between science and manufacturing is precisely in the fact that the basic "client" is juridically not a client. He assumes the obligation of doing much work, including experimental work ordered by scientific organizations and important for the development of their own investigations not directly involved in the solution of some production problems. The contract system of long-range cooperative relationships also covers legal questions of the creation and activity of joint laboratories that do not only application work needed by the plant (association)--co-owner of the laboratory, but also research of a general scientific nature.

*On Cooperation Contracts in the Practice of Scientific-Technological Cooperation between CEMA Members. See Trakhtengerts, L. A.; Karpenko, O. M. Legal Status of Coordination Centers. "Trudy" VNIISZ [All-Union Scientific Research Institute of Soviet Legislation]. No 10, Moscow, 1977, pp 141-152.

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Finally, the most important feature of the new system of contract relationships is the circumstance that it always includes the target stage--the introduction of the obtained scientific-technological achievements into production. True, cooperation contracts concluded on the basis of "social initiatives" do not contain concrete regulations of the order of the practical introduction of the result of scientific production cooperation and is limited usually to a general statement on the obligations of manufacturing "to implement the introduction of completed scientific developments in the shortest possible time." Such contracts cannot solve problems of the responsibility for the untimely introduction of the scientific-technological results obtained. Such regulation may be realized only on the legislative basis.

The tremendous possibilities that can be opened up by legislative setting up, developing and widely using the new system of contract relationships as an organizational-economic and legal form of transforming science into a direct productive force are, regrettably, still not evaluated to the utmost. One of the main possibilities, flowing from the very nature of the contract system of long-range cooperation between science and manufacturing--is its use as a most successful juridical form of target-program organization of scientific-technological progress. We have in mind not general agreements between ministries, but contracts among scientific establishments, VUZ, design bureaus and enterprises that regulate concrete relationships of scientific-technological cooperation. The contracts on long-range cooperation between science and manufacturing were literally created especially for the requirements of the legal organization of target-program control: in fact, contract cooperation is a system of relationships of various participants directed toward achieving a single goal (introducing into production the comprehensive scientific-technological results).

The contract forms of long-range cooperation when they are legally set up would make it possible to solve many problems of economic responsibility and interest participating organizations in fulfilling the tasks of the scientific-technological target programs. Industrial ministries and scientific centers (including republic academies of sciences) would become the guarantors of fulfilling contract obligations of institutes, design bureaus, associations and enterprises in a system of long-range cooperation. In this, of course, it would be necessary to take into account the complicated composition of scientific-technological relationships: in fact, they cover relationships not only of a proprietary nature, but also of an organizational nature (including planning and administrative). All this points to the vital necessity of developing and adopting a legislative act, for example, a general regulation on contracts for long-range cooperation between science and manufacturing.

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CONFERENCE STRESSES COOPERATION OF UNIVERSITIES AND ACADEMY OF SCIENCES IN SCIENTIFIC RESEARCH

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 4, Apr 80 pp 4-17

[Report from the Presidium of the USSR Academy of Sciences: "On Strengthening Ties between the Universities and the Scientific Establishments of the USSR Academy of Sciences"]

[Text] A joint convocation of the Presidium of the USSR Academy of Sciences and the Collegium of the USSR Ministry of Higher and Secondary Specialized Education was held, at which the work of the universities and their interaction with the system of scientific establishments of the Academy were discussed.

In its decree, "On the Further Development of the University and Increasing the Quality of Training of Specialists" (July 1979), the CPSU Central Committee and the USSR Council of Ministers recognized the necessity of taking measures aimed at further improving the activities of the university; expanding its role in socio-economic and scientific-technical progress; and furnishing more skilled cadres to the leading sectors of the nation's economy. The task was assigned to raise the level of training of the future specialists. Toward these ends, it has been proposed to enlist more broadly the academicians and associate members of the USSR Academy of Sciences, and other leading scientists, for scientific-pedagogical activities in the VUZ's. The decree points out the necessity for improving the organization of scientific research work in the VUZ's and to utilize their scientific potential more effectively.

Establishing close creative ties between the Academy of Sciences and the university was at the center of attention of those participating in the session, at which an address was made by V. P. Yelyutin, USSR Minister of Higher and Secondary Special Education, and Associate Member of the USSR Academy of Sciences.

"Bilateral ties between science and higher education," said V. P. Yelyutin, "is an objective reality of the intellectual life of a modern society. In their historical development they have gone along arm in arm. The modern aspect of the university assumed its present form under the definitive

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influence of science. In the past and at present it continues to reinforce science with its graduates, and in its capacity as a scientific establishment itself actively participates in the process of accumulating new knowledge and its practical materialization. However, our modernity and the entire pace of further perfecting the society of developed socialism requires a new concept of the interrelationship of science and education, and a new approach to the realization of its creative union.

"Comrade L. I. Brezhnev stated at the 25th CPSU Congress, that 'The success of the scientific-technical revolution and its beneficial influence on the economy and on all aspects of the life of society cannot be assured by the efforts of the scientific workers alone. Enlisting all those participating in social production in this historically-significant process is assuming an ever-greater role in all sections of the economic mechanism.' On the basis of the principal instructions of the party, the university must first of all significantly increase the level of training of specialists; and secondly, support the enlistment of all of the many millions on its staff in the process of the scientific quest, and significantly increase its scientific potential and the effectiveness of its utilization.

"Those who have gathered here today to discuss the designated problems," continued V. P. Yelyutin, "Officials from the Academy of Sciences and the Ministry of Higher and Secondary Special Education, are carrying out a direct commission of the CPSU Central Committee and the USSR Council of Ministers, which adopted in April 1978 the decree, 'On Increasing the Effectiveness of Scientific Research Work at the Higher Educational Institutions,' containing a host of provisions the realization of which requires strengthening the contacts between the USSR Academy of Sciences and the universities. An extensive program for perfecting science at the university, contained in this document, proposes further strengthening of the role of the university in the national system of scientific institutions, and transforming it into a powerful inter-sectorial scientific complex, capable of conducting active research in practically all spheres of knowledge, and providing for the introduction of these achievements into the national economy.

"Even today an intensive quest for research is being carried on in practically all of our 870 universities and institutes, in which nearly one-half million scientific-pedagogical personnel are concentrated. Among these are 18,000 doctors and 175,000 candidates of science; and this is nearly half of all the workers with scholarly degrees and titles in our country. More than 500 academicians and associate members of the USSR Academy of Sciences, and the academies of science of the union republics, are working at the universities. And here it is fitting to pause on the question of combined jobs. At one time it was forbidden to hold more than one office in a university, in order to weed out abuses in this area. But in fact this has led to a situation where a significant part of the university's qualified cadres was lost. Subsequently a number of amendments to the normative act were adopted, which permit more latitude in recruiting prominent scholars and workers from the various sectors of the national economy for scientific-pedagogical activities.

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And the 57,000 graduate students at the university have made no small contribution to science; of these, 1,800 have been enlisted for research work.

"Along with the more than 30,000 faculties—the basic link in the academic organization at the VUZ—there is an extensive system of scientific institutions. Among these are 60 scientific research institutes, about 1,500 problem and industrial branch laboratories, as well as computer centers, botanical gardens, observatories, museums, experimental design bureaus and about 450 scientific research sectors. The organization of the North Caucasus Science Center, which was established through the combined efforts of the university and the USSR Academy of Sciences, has proved its worth. Possessing such a powerful intellectual potential and broad organizational capabilities, the higher educational institutions are expanding their activities in the main channel of the development of Soviet science. They are carrying out a large amount of the work connected with the tasks in the state plans for the economic and social development of the USSR and the union republics; with the various government decrees; with work programs on solving basic scientific and technical problems; with plans for scientific research in the spheres of natural and social sciences; and with the industrial sector and republic plans for scientific research work in utilizing the achievements of science and technology in manufacturing.

"In the last six years alone, expenditures for scientific research work in the system of Minvuz, USSR [Ministry of Higher and Secondary Special Education], have grown by more than two times, and in 1978 were in excess of 1.102 billion rubles. At the returns to science rendered by the VUZ's have grown as well. In 1978, for example, scholars at the VUZ's produced more than 3,000 monographs, an equal amount of textbooks and educational materials, and contributed 130,000 articles to all-union and foreign scientific magazines. More than 11,000 certificates of authorship were granted for inventions, as well as 320 foreign patents; and a number of licenses have been sold. Industry confirms that the economic effect from the use of studies carried out by the VUZ's, in 1978 alone amounted to nearly two billion rubles, which exceeds by nearly two times all the expenditures for science in the universities.

"Nevertheless," noted V. P. Yelyutin, "The state of scientific research work in the universities cannot be deemed wholly satisfactory. As was pointed out in the decree of the CPSU Central Committee and the USSR Council of Ministers, 'On Increasing the Effectiveness of Scientific Research Work in the Higher Educational Institutions,' the scientific potential of the universities and their skilled personnel are not being fully utilized in solving the most important scientific-technical and socio-economic problems; there are still few important, complex research projects carried out at the higher educational institutions. The CPSU Central Committee and the Soviet government have assigned to the State Committee on Science and Technology, to the Academy of Sciences, and Minvuz, USSR, the task of more extensively involving the VUZ's, which possess skilled cadres, in carrying out basic scientific research and practical studies in accordance with state plans for the development of science and technology.

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"It has been shown that it is necessary to implement a number of practical measures for concentrating forces and resources on the most important problems of science and technology; to provide for fundamental improvements in the planning and coordinating of scientific research work in the VUZ's; and to create the conditions for strengthening the ties between the processes of education and research."

In this regard, the speaker paid special attention to the development of basic research at the university. It is well-known that accelerating the rate of scientific and technical progress is not possible without advanced development of fundamental and exploratory research, the results of which serve as the basis for highly-efficient technical solutions and the creation of principally new, progressive technological processes. The development of such research in the universities is required, in order to train skilled specialists with a broad background. However, the proportion of fundamental scientific work in the total volume of scientific research work in the VUZ's is constantly declining, primarily as a result of insufficient funding of science at the VUZ's in the state budget, the amount of which in 1978 totalled little more than 14 percent of all funds received by the VUZ's from various sources. The VUZ's monies are for the most part fixed by contract and they cannot be used for fundamental research.

Experience shows that by far the most scientific research in the areas of the natural and the social sciences is found in those VUZ's which actively collaborate with the scientific institutions of the USSR Academy of Sciences and the academies of sciences of the union republics.

The speaker considers that on the whole, the state of the creative ties between the higher educational institutions and the institutions of the Academy must be rated favorably. The Presidium of the USSR Academy of Sciences continually renders assistance to the universities. A significant contribution to increasing the level of training of specialists was made in the implementing of the plan worked out jointly by the Minvuz and the USSR Academy of Sciences, containing measures for carrying out the decree of the CPSU Central Committee and the USSR Council of Ministers, "On Measures for the Further Perfection of Higher Education in the Nation." The educational plans and programs of the VUZ's have been reexamined by scholars from the scientific institutions; and twelve scientific-methodological councils and commissions on the disciplines taught in the VUZ's are headed by academicians and associate members of the USSR Academy of Sciences.

The close collaboration of the institutions of the USSR Academy of Sciences and the VUZ's is the creative basis on which instruction was organized in an entire series of new subjects; also established were special departments for refresher training of the cadres in the new, forward-looking directions of science and technology. It is considered exceptionally important that the specialists are being trained in these departments in the most up-to-date, rapidly-developing directions of fundamental science and new technology, such as the physics and technology of magnetic memory; the theory and technology of laser communications; automation of experimental research; robots

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and manipulators; optimization of engineering solutions; uninterrupted control methods; and so forth. Taking part in the work of the departments are scholars from the institutions of the Academy, specialists who have mastered the very latest achievements in the corresponding areas of knowledge.

At the same time, V.P. Yelyutin believes, these departments can be utilized for increasing the qualifications of the research fellows of the Academy of Sciences itself, for training groups of special-purpose specialists in particular, with the aim of supporting the introduction of the results of scientific research into manufacturing. The first such experience, which concerns a new area of science and technology—powdered metallurgy—is already being conducted; simultaneously, new equipment is being introduced and specialists are being trained who will use the new technology and equipment.

Collaboration with the VUZ's on the part of prominent scholars of the USSR Academy of Sciences in organizing the educational process and conducting scientific research has become a tradition. In the 1977-78 academic year alone more than 650 research fellows at the institutions of the academy, among whom are 30 academicians and 47 associate members of the USSR Academy of Sciences, traveled to the higher educational institutions to deliver lectures to the students, and assisted the professorial-instructor staff of the VUZ's in their educational and scientific work.

Scholars at the academy's scientific institutions are taking an active part in creating textbooks and educational materials for the universities. During this five-year plan, for example, there were 37 academicians and six associate members of the USSR Academy of Sciences among the authors of books for university students. "It is a pleasure to note," the speaker emphasized, "That some splendid textbooks are being turned out by our prominent scholars. Several of these, such as 'Obyknoennyye Differentsial'nye Urovneniya' [Plain Differential Equations], by Academician L. S. Pontryagin; and 'Tekhnicheskaya Termodinamika' [Industrial Thermodynamics], by Academicians V. A. Kirillin, A. E. Sheyndlin and V. V. Sychev, were awarded USSR State Prizes.

Industrial and practical familiarization, and laboratory classes, are being organized for students at the facilities of the academy's institutions, and accredited course work leading to diplomas is being conducted. Thus, the University of Novosibirsk and the Moscow Institute of Physics and Engineering are organizing educational pursuits for upper-level students within the very walls of the institutions of the USSR Academy of Sciences.

Cooperation with the Academy of Sciences is also being developed in the matter of training science instructor personnel. Many institutes of the academy are conducting special-purpose training for graduate students at the provincial and at the new VUZ's. At the same time training of special graduate students in a number of specialties is being conducted in the leading VUZ's for the republic academies of sciences. And the USSR Academy of Sciences is rendering assistance to Minvuz, USSR, in increasing the qualifications of the instructors.

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V. P. Yelyutin reported, that scholars at the higher educational institutions are becoming oriented toward opportunities for more active participation in work in accordance with the plans of the USSR Academy of Sciences and the academies of sciences of the union republics. As a result of this, and owing to the cooperation of the departments and scientific councils of the USSR Academy of Sciences the number of scientific research projects in the VUZ's coordinated by the academy is growing year by year. Whereas in 1975 there were fewer than 4,300, in 1978 there were 6,000 projects.

Scholars at the universities and the Academy of Sciences are cooperating successfully in publishing the results of scientific research, in the preparation of monographs and collections of scientific works; and in organization of regional, all-union and international scientific-technical conferences, congresses and symposia.

It is especially fitting to speak of the now-traditional ties between the social science scholars of the USSR Academy of Sciences, IMEL [Marx-Engels-Lenin Institute] at the CPSU Central Committee, the academies of sciences of the union republics and the higher educational institutions of the nation. The fruitfulness of these ties is manifested in particular in the preparation and publication of basic textbooks on Marxist-Leninist theory. Thus, textbooks were prepared and published on scientific communism, edited by Academician P. N. Fedoseev; on political economics, edited by Academician A. M. Rumyantsev; on Marxist-Leninist philosophy, edited by F. V. Konstantinov; and on the history of the CPSU, edited by B. N. Ponomarev. The aforementioned textbooks have gone through several editions and were translated in many socialist countries. One can say without exaggeration that these books have become familiar to all who are study Marxist-Leninist theory.

A number of VUZ collectives have been recruited by academy departments as co-executors in working out actual, far-reaching scientific problems. The speaker expressed the desire, that this work will become still more deeply rooted and that it will be coordinated with the problem councils of the USSR Academy of Sciences.

Concerning the scale of student participation in scientific research projects, in the opinion of V. P. Yelyutin, the results of the annual all-union competitions for the best student scientific work in the natural, technical and humanitarian sciences are good examples. The increase in popularity of these competitions is to no small degree promoted by the establishment of the medals of the Academy of Sciences, with prizes for the students at the higher educational institutions. The VASKhNIL [All-Union Academy of Agricultural Sciences imeni V. I. Lenin], the Academy of Medical Sciences, and the USSR Academy of Pedagogical Sciences followed the example of the "great" academy in this respect and have also established medals for the best student scientific work in their respective areas. In all, 400 such medals have been established.

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As a rule it is possible to solve the major scientific problems and make the fundamental discoveries capable of accomplishing great changes in science and technology, at the modern stage of the scientific-technical revolution, only through the efforts of large scientific collectives and associations of specialists of diverse backgrounds, who possess capacious laboratories and experimental facilities. "It is just for this reason," the speaker confirmed, "That we ascribe especially great significance to the organization of joint research by scientists at the universities and at the scientific establishments of the academy. There are numerous shining examples of such joint research work, which have provided great scientific and practical results. Suffice it to say that a significant amount of the work for which Lenin and State Prizes have been awarded and which has been registered as scientific discoveries, was carried out by scientists at higher educational institutes with the co-authorship of scientists of the institutions of the academy."

Thus far, the material-technical base of the departments and scientific institutions of the VUZ's and the condition of equipping them with unique and costly instruments and computer facilities, still lags far behind that of the leading institutions of the academy and the industrial sectors. Creative cooperation among the collectives of the VUZ and the scientific research institutes of the academy permits use of the laboratory and experimental facilities while carrying out joint research projects at the most modern methodological and technical-experimental level. As examples, V. P. Yelyutin cited the work carried out by the staff of scientists at the Physical Institute imeni P. N. Lebedev of the USSR Academy of Sciences, the Atomic Energy Institute imeni P. N. Lebedev, and at the University of Moscow on developing the physical principles and on creating and researching gas lasers energized with the use of ionized evolution. The use of instruments of the Byurakanskaya Astronomical Observatory of the Armenian SSR Academy of Sciences, as the speaker stated, permitted the scientists at the University of Yerevan to solve a number of the most important problems in astrophysics.

While evaluating the condition of the ties of the university with the USSR Academy of Sciences as good, V. P. Yelyutin nevertheless acknowledged that in this area everything is far from finished, and by far not all the existing capabilities have been utilized. One would hope that the academy's scholars would participate more in the educational-training process in the VUZ's and in training and increasing the qualifications of the scientific research cadres. This task requires imparting to the ties a long-term, systematic character. In the draft resolution of the Presidium of the USSR Academy of Sciences and the Collegium of Minvuz, USSR, a proposal was included on creating a special joint organization for coordinating the contacts between the universities and the USSR Academy of Sciences, for defining the long-term directions of joint scientific research work, and for generalization and dissemination of progressive experience in this area. At the same time, it is proper to provide closer cooperation between the scientific problem councils of the USSR Academy of Sciences and the section of the Scientific-Technical Council of Minvuz, USSR. Mutual representation in them of scientists from the universities and the institutes of the academy must be expanded; the conducting of joint sessions should be put into practice; in a word, permanent business contacts should be established in this area as well.

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Worthy of attention is the proposal on organizing complex scientific associations composed of institutions of the USSR Academy of Sciences, higher educational institutions, industrial branch design organizations and the industrial enterprises which have been designated for working out concrete, long-term problems. There is already positive experience to substantiate this proposal. A tripartite agreement on the introduction of electronic ray technology is being successfully implemented among the Kursk Polytechnical Institute, the "Akkumulyatory" Plant and the Electric Welding Institute imeni E. O. Paton of the UKSSR Academy of Sciences. A similar agreement is being concluded between the Krasnoyarsk VTUZ /Technical VUZ/ Plant, its base enterprise and the Institute of Physics of the Siberian Department, USSR Academy of Sciences.

Still another important question is connected with the practice of concluding complex long-term agreements on cooperation between the higher educational institutions and the institutes of the USSR Academy of Sciences, which has become widespread in recent years. It would be expedient to conduct thorough joint analysis of the existing experience, and make recommendations for broad utilization of this intelligent form of standard agreement on creative cooperation between the VUZ's and the scientific establishments of the system of the Academy of Sciences, embracing all aspects of the joint activities: the educational process, training of the scientific-pedagogical cadres, and the scientific research.

The joint session, dedicated to the strengthening and development of creative ties between the USSR academy of Sciences and the university, is being held for the first time. The speaker introduced a proposal to recommend to the ministries of higher and secondary special education of the union republics and to the presidiums of the republic academy of sciences, to hold similar meetings as well. Their results will open new possibilities for developing creative ties among the VUZ's and the scientific institutions.

Each forward step made by science requires new forward movement in the area of education. But the success of scientific though depends also on the rate of progress in education. "Permit me to express my conviction," V. P. Yelyutin stated at the conclusion of his report, "That the collectives of the VUZ's and the scientific institutions of the USSR Academy of Sciences, jointly strengthening their creative cooperation, will make a worthy contribution toward the joint development of our native science; toward the acceleration of the scientific-technical and socio-economic progress of Soviet society; and toward raising the standard of living of the people and strengthening the might of our Motherland."

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During the discussion of the report, Vice President of the USSR Academy of Sciences, Academician G. I. Marchuk, called attention to the fact that the number of instructors and research fellows in the universities is much greater than the number of scientists in the system of the academy. "Here," he said,

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"We have a matter of enormous scientific potential which we are not utilizing completely, although science has put down deep roots in a number of VUZ's, not only in Moscow and Leningrad but in the provinces as well. For example, in Tomsk there are two first-class scientific research institutes: the Siberian Physico-Technical Institute and the Institute of Nuclear Physics. These institutes, which are at higher educational institutions, are playing a very great role, and according to the level of research being conducted are in no way inferior to the academy.

"When speaking of the training of cadres in the university for the Academy of Sciences, one must note that the close ties of the academy's institutions with the VUZ's—especially in Moscow, Leningrad and Novosibirsk—permit selection of intelligent people for science; but their state of preparedness is not adequate.

"The party requires that the scientists find new concrete forms for the ties between academy and VUZ science. In the Siberian Department of the USSR Academy of Sciences regional programs have become bases for this work; in particular, the entire complex of the 'Sibir' program, in which a large number of scientists have been active including those of the VUZ. Joint preparations are being made for scientific conferences, to include international conferences.

"For the VUZ's in the provinces a well-placed special-purpose graduate program in the scientific institutions of the Academy is especially important; this is also one of the forms of contact between the Academy and the universities. The Siberian Department has established ten chairs in the universities and institutes of Siberia and the Far East. And Minvuz, USSR, has taken special note of this initiative."

"Right now, in five cities in which there are affiliates of the Siberian Department of the USSR Academy of Sciences, there are five universities; the activities of these and others are well-coordinated. "They have hardly done everything possible," G. I. Marchuk considers; "But it is better to begin with the concrete: for example, with the establishment of joint expeditions; expanding special-purpose graduate fellowships at the VUZ's; and organizing workers' conferences on determining the direction for research."

Deputy Minister of Higher and Secondary Special Education, RSFSR, E. K. Kalinin, speaking on the subject of what has been done by the higher educational institutions and Minvuz of the Russian Federation, for strengthening cooperation between the university and the USSR Academy of Sciences, reported that: "Specifically, in 1978 scholars at the VUZ's had conducted research on 1,414 topics which were included in the coordinated plans of the Academy. New educational and scientific complexes are being established jointly. One of those functioning successfully is organized on the facilities of several faculty departments of the Irkutsk Polytechnical Institute and the Siberian Power Engineering Institute of the Siberian Department, USSR Academy of Sciences. In general, very good cooperation has been established between the VUZ's and the institutes of the Academy in Siberia; the agreement concluded earlier in 1979 between Minvuz, RSFSR, and the Siberian Department is taking

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on special significance. In addition to that which has already been mentioned, they envisage, for example, joint use of experimental facilities and collective use of unique equipment. The most important aspect of the agreement is the organization of a number of programs for regional complexes by Minvuz, RSFSR, and the Siberian Department of the USSR Academy of Sciences on developing the natural resources of Siberia. A complex program on automation of scientific research is being organized jointly with the USSR Academy of Sciences. The goal of this program is to develop the means of automation in the interest of the Academy and the university. And there is preliminary agreement with the Academy for organizing yet another complex program on power engineering.

"Preparations are in progress for development and manufacturing in the 10th Five Year Plan of unique and hard-to-get scientific equipment and instruments for joint research. It is envisaged that no matter what kind of instrument is developed in the university, its manufacture in quantities required for both the university and the Academy of Sciences will be assured. And the Academy will do the same.

"Proposals are also being developed concerning scientific-educational centers for the Academy and Minvuz along the Volga, in Siberia and the Far East. The question has been decided concerning organization of such a center at the Kuybyshev Institute of Aviation. At the initial stage it is proposed to create a laboratory of the Academy on automation of scientific research there. The corresponding departments of the VUZ will be attached to it, as well as experimental production facilities. Being structurally a subdivision of the VUZ for planning and methodology, this laboratory should be placed under the USSR Academy of Sciences."

"The general directions of the research, the principles of cooperation and coordination of the work in the area of the social sciences," said Vice President of the USSR Academy of Sciences, Academician P. N. Fedoseyev, "Is determined for the long run in each five-year plan at joint sessions of the USSR Academy of Sciences and the Ministry of Higher and Secondary Special Education of the USSR, and then is defined concretely by problem councils of the Academy. In this manner, significant results have been achieved on a number of important scientific problems, especially on questions of the history of the USSR, the history of social thought, and literature. At the same time it is fitting to point to the fact that the activity of the scientific councils concerns primarily the scientists in Moscow and the VUZ's in the capital cities. For example, in Saratov there is the respectable Povolzhskiy Scientific Council—or, to put it more aptly, center for social sciences—which brings together hundreds of skilled specialists in the social sciences from the Volga area. But the Academy's problem councils are not well connected with these. The complaints expressed to the Academy's councils on this matter by the workers of the provincial VUZ's are completely justified. And after all, in solving economic problems, cooperation in sociological research is especially important, not only with the capital but also with the provincial higher educational institutions. And the same can be said of questions on the history of the USSR.

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"The fruitful cooperation of the scientists of the Academy and the universities in working out the 'Sibir' program was already spoken of at the conference. But during the study of the problems of the Non-chernozem Belt such cooperation was, unfortunately, lacking; although support to the VUZ cadres of sociologists, economists and especially agrarian economists, is sorely needed.

"It is obviously appropriate to think through and define a system and structure for the ties between the Academy's councils on scientific problems and the extensive system of VUZ's, bearing in mind that representation of one VUZ or another at the council will still not solve the problem since all VUZ's cannot be included in this manner. Evidently, the councils should depend on an association of certain VUZ's in their work. In general, the questions of the work, the composition, functions, tasks and obligations of the Academy's councils on scientific problems should be among the most important.

"And still another remark: It is very important to delineate in the scientific work those crash programs and those sectors, where the assistance of the VUZ cadres is especially needed."

Vice President of the USSR Academy of Sciences, Academician B. N. Petrov, expressed his opinion that the Academy's scientific councils have played a large role in bringing together the scientists and workers of the various ministries and departments, as well as the universities. The creation of the gamma telescope, which was accomplished by the efforts of the Institute of Space Research of the USSR Academy of Sciences and a number of other Academy and VUZ organizations, can serve as an example. A good beginning was made with the organization of a scientific association in Leningrad, composed of the scientific research computer center of the USSR Academy of Sciences, the Leningrad Electrical Engineering Institute and the "Krasnaya Zarya" Association, for the study of problems associated with the use of computer technology in scientific research projects. A large project, in which a number of the Academy's scientists are participating, is being conducted by the Moscow Institute of Aviation.

The activity of many scientific councils, in particular the Scientific Council of the USSR Academy of Sciences on Problems of Traffic Control and Navigation, is organized such that a number of sections are headed by scientists from the VUZ's. The USSR National Committee on Automatic Control has its own territorial groups in all the republics and the largest regions of the nation. Many VUZ's, institutes and independent laboratories of the VUZ's have already achieved a high level of work. Take for example, the Institute of Mechanics of the MGU [Moscow State University]. In terms of the depth of the research, this is an Academy institute, and that is why the activity of the institute is reflected in the coordinated plans of the USSR Academy of Sciences. All of these are individual examples, and one could have cited more.

The undertaking of Minvuz connected with developing complex programs deserves high marks, particularly that on the automation of scientific research. Obviously, such programs could become the basis for establishing experimental scientific-technical associations of the Academy, the university and industry.

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An important role is played by discussing at the VUZ's the research being carried out at one or another of the Academy's institutions. The Department of Mechanics and Control Processes, and the Department of Physical Chemistry and the Technology of Inorganic Materials of the USSR Academy of Sciences have conducted guest sessions at the MAI [Moscow Aviation Institute] and at the Moscow Institute of Chemical Technology imeni D. I. Mendeleev (MKhTI). The work of a number of laboratories was carefully examined there, and one could become acquainted with various concrete studies. Such guest conferences should be held more often.

It is undoubtedly proper to support the initiative of Minvuz in the plan for creating educational-scientific centers. But this initiative is being delayed because of the lack of accommodations and proper equipment. Equipment for such centers was demonstrated in Moscow at an exhibit devoted to joint projects of the socialist nations in the area of computer technology. A selection of such equipment could have been made the basis for equipping the VUZ educational-scientific centers with modern instruments and computer technology facilities.

The Rector of MKhTI imeni D. I. Mendeleev, Associate Member of the USSR Academy of Sciences, G. A. Yagodin, stressed the necessity for expanding and strengthening the creative cooperation of the USSR Academy of Sciences and the university in solving the historic problem of combining the gains of the scientific-technical revolution with the advantages of the socialist system of management, and the necessity for studying and disseminating the experience of the progressive VUZ's in this area. Scientific research work in the VUZ's is an important means for improving the quality of training of specialists. It has an influence on the entire pedagogical process, on the quality of the lectures and practical studies, and on the psychology of the instructors and the students. The active cooperation of the VUZ's with the USSR Academy of Sciences is an effective method for increasing the topicality and quality of the scientific research conducted at the university.

Ties between MKhTI and the Academy of Sciences have become a tradition; seven of its graduates have become academicians and 17, associate members of the USSR Academy of Sciences. Work on special-purpose scientific-technical programs is going well at the institute. There are 18 such programs at the institute, and they bring together 65 themes the development of which occupies more than a third of the professorial-instructor staff. In its work, MKhTI is associated with 20 institutes of the USSR and the republic academies of sciences. The Academy's institutes have offered the "Mendeleevka" the opportunity to utilize their unique equipment. Research fellows at the institute publish up to 1,000 articles per year, about half of them in the magazines of the USSR Academy of Sciences. Scientists at the institute are working in 16 of its problem councils and are members of a number of the editorial boards of the Academy's magazines.

V. V. Rzhavskiy, rector of the Moscow Mining Institute, spoke of the necessity of enlisting specialists of various backgrounds from Moscow's VUZ's for work on the coordinated plans of the Academy of Sciences. He stressed the importance of the VUZ's scientists and students in exploratory research (projects in

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applied science are also carried out under economic agreements), as well as in introducing the results of basic scientific work into practice. "Perhaps," he said, "For these purposes it makes sense to conclude agreements on cooperation between the VUZ's of an industrial sector and the corresponding institutions of the Academy."

Academician Secretary of the Department of Geology, Geophysics and Geochemistry, B. S. Sokolov, considers that neither the VUZ's nor the Academy's scientific potential is yet being used effectively: "The VUZ's and the Academy have much in common, above all the fact that the students at the VUZ's represent the future of all Soviet science. Their training must be conducted at a strictly modern level. At the same time many departments in our VUZ's are poor in terms of research equipment; in some of them it has not been modernized in decades. Furthermore, both the instructors and the students are weighted down by the mandatory academic 'obligations'. A person who must teach from 700 to 800 hours during an academic year cannot be profitably occupied with science; for, in practice the number of hours is doubled and even tripled! Obviously, Minvuz itself must reevaluate in the most serious manner the system of academic workload of the instructors and the students, significantly increasing the latter's time for independent work. At the same time it is fitting to increase the participation of personnel at the Academy's institutions in the educational process. On this plane, the University of Novosibirsk can serve as an example: Its students, beginning with their sophomore year, perfect their knowledge in the institutes of the Academy. Here, the training of specialists by the piece has become a reality, if one may put it that way. The same could be achieved in a number of the VUZ's of Moscow, Leningrad, Kiev and other cities, where there is a strong academic and industrial branch scientific research base."

The rector of the Moscow Higher Technical School imeni N. E. Bauman, Academician G. A. Nikolayev, expressed agreement with the speaker quoted above, with regard to training scientific personnel in the VUZ's. However, he considers the system of training engineers for the national economy—designers, technologists, economists and so on—has its own peculiar features. "I am particularly impressed," said G. A. Nikolayev, "with the proposal made at the session on creating associations among the Academy, the VUZ's, the OKB Special Design Bureau and manufacturing. At the same time, of course, one need not necessarily have an entire VUZ in mind; this can apply to only a certain individual direction of its work."

From the point of view of the speaker, science should not be separated into Academy science or VUZ science; science is one, although there are special features. Therefore, the basis for an idea on joint work should originate at the Academy, be thoroughly developed at the VUZ, and then be sent to the OKB and subsequently to manufacturing.

G. A. Nikolayev welcomed the establishment of base VUZ departments at the institutes of the Academy, and at the same time called attention to the administration of the fundamental disciplines by the departments (mathematics, physics, chemistry), which are very seldom headed by members of the Academy.

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In this sphere, the Academy's assistance has been essential. And, evidently, it is necessary to indicate the need for close ties — above all between the Academy and the so-called basic VUZ's, which should become foremost with respect to the scientific. It would also be useful to organize a special section in the Moscow Council of Rectors to deal with questions of ties with the scientific establishments of the Academy.

Vice President of the USSR Academy of Sciences, Academician A. V. Siderenko, declared that, "The question examined at the conference is especially important just now, at the present stage of coordination of the efforts of all of Soviet science directed toward development of the national economy."

"The various geological councils of the Academy," the speaker reported, "To a great degree consist of scientists from the Academy and from the university and have never been divided in terms of departmental subordination by anyone. But that is at the center, whereas in the provinces the situation is somewhat different. Therefore, the prestigious councils on scientific problems would be well advised to devote some thought to organizing a complex of scientific establishments of the Academy and the university—corresponding with the branches of the councils in the localities. The editorial staff of the magazines which are published along the lines of 'Sections of Earth Science,' as a rule are made up not according to departmental criteria but according to the prestige of the scientific personnel. This practice should be expanded.

"The USSR Ministry of Geology at one time had established base geological administrations and expeditions for conducting student practical work. The utility of this measure was never in doubt. Course work completed by the students at the basic geological organizations, in a number of cases served as the basis for future degree work and candidate dissertations. It would be fitting to make certain scientific research institutes into bases for conducting probationary work for mastering new methods; having specified in special documents the appropriate ties between the Ministry of Geology and Minvuz, between Minvuz and the Academy of Sciences, and between the departments of the VUZ's and the subordinate units of the scientific research institutes."

A. V. Siderenko stated that, in his opinion, there is one essential mistake in the training of the professorial-instructor staff of the VUZ's that must be corrected: year in, year out it is made up of its own graduates. Very few instructors have completed a good industrial school or school for scientific work in the system of the Academy.

It would be expedient to enlist more widely the outstanding scientists, to deliver lectures in the VUZ's on scientific problems; to teach small independent courses where the fundamentals of the most important achievements of modern science could be brought to light. This would facilitate enhancing the knowledge of the professors and instructors as well as the students. Probably every member of the Presidium of the USSR Academy of Sciences, and every prominent scientist would be able to take part in this work.

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Rector of the Kuybyshev Institute of Aviation, V. P. Lukachev, dedicated his speech to one of the new forms of ties between the Academy and the university. He reported that in Kuybyshev there are about 74,000 students; that the city's higher educational institutions are working on dozens of scientific programs which have industrial, republic and union significance, and that the Kuybyshev VUZ's have begun to take part in projects which are being carried out jointly with a number of ministries, and with many industrial branch and Academy institutions. In order to better and more fully utilize the existing scientific potential, the speaker proposed organizing in the Volga area special scientific-educational centers in the university framework, which would cooperate in conducting research in accordance with the programs of the USSR Academy of Sciences. With the establishment of Academy laboratories in the VUZ's, it is necessary to strengthen their material base as well. This base can be used also for better training of specialists for the national economy.

The Academician Secretary of the Department of Biochemistry, Biophysics and Chemistry of Physiologically Active Compounds, A. A. Bayev, stressed the importance of scientific projects and programs as the basis for joint work by the Academy of Sciences and the university.

The question of the quality of training of specialists by the universities was formulated by Academician N. N. Inozemtsev. "Apparently," he said, "The situation varies according to the various disciplines; but the situation with respect to training economists cannot be considered satisfactory. One of the main reasons is the unsatisfactory level of the basic instructor staff at the university. And the fact that the overwhelming number of graduate students in economics are concentrated in the VUZ's which have an insufficient number of highly-qualified instructors leads to a proliferation of poorly-prepared specialists. Incidentally, in such Academy institutes as the Institute of World Economics and International Relations, the yearly flow of graduate students is only ten people. And this, with 75 doctors of science! It is by all accounts expedient to sharply redistribute the spaces for graduate students in favor of those scientific institutions which are able to provide the required level of training for specialists. It is high time to do this, if we are genuinely concerned about the future of science, and about the future of higher education.

"As far as special-purpose graduate fellowships are concerned, these should also be restructured. Because right now, if you call a spade a spade, there are two types of graduate students: those who have passed through competition, and the 'sedentary types' to whom passing an examination with a score of three is sufficient, in order to remain in graduate school. Are there really only a few talented people in the country? Should not genuine competition be set up for everyone so that those selected for graduate school are truly the best?"

In his summary of the discussion, President of the USSR Academy of Sciences, Academician A. P. Aleksandrov, remarked that: "The most important task of the session was to promote the capability of the higher educational institutions to turn out specialists who are capable of creative work. And such a genus of specialists can be trained for our science, industry and agriculture only in the process of creative research activity in the VUZ's and the institutes of the Academy."

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From the many questions raised during the discussion of V. P. Yelyutin's report, the president selected the question of equipping the VUZ's with modern research technology. "Obviously," he said, "This problem will be solved more quickly in the Academy will take it up together with the VUZ's. This will permit enlisting the student-designers in the affair also, and will permit overcoming the difficulties connected with producing the instruments in small lots." The Academy is transferring a part of its equipment to the VUZ's. "But in addition," said A. P. Aleksandrov, "We are asking that the equipment which is transferred be handled with care. And the Academies of Sciences and VUZ's now must pay the most serious attention to automation of experiments in physics, chemistry, biology and the other sciences. The complex of instruments manufactured by the industry of the socialist countries permits extensive automation of experiments." A. P. Aleksandrov stressed the need for a unified ideology, and standardization in establishing the facilities for a mechanical experiment.

In the opinion of the president, familiarity with computer systems and technology used in the Academy's institutes is of great advantage to future VUZ graduates. Thus, the young specialist entering industry will have mastered modern systems and can participate in work on introducing the results of basic research into the national economy.

In conclusion, A. P. Aleksandrov suggested that those participating in the conference who did not have the opportunity to speak, submit their proposals in writing so that they might be taken into consideration in the resolution concerning the question which was discussed.

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In the resolution which was adopted, it was noted that up to now the forms of cooperation between the university and the USSR Academy of Sciences which have taken shape have fully justified themselves: such as, participation of the VUZ's in joint research with the scientific establishments of the USSR Academy of Sciences on coordinated plans in the area of the natural and social sciences; conducting scientific research work on the basis of agreements on scientific cooperation; publication of joint scientific projects; participation of VUZ scientists in drawing up programs on solution of the most important problems in the area of the natural and the social sciences for the years 1976-1990; tours by members of the departments of the USSR Academy of Sciences to the provincial VUZ's for familiarization with organizing educational and scientific work in the localities, rendering scientific and methodological assistance, and delivering lectures; jointly conducting international congresses, all-union conferences, seminars and symposia; and participation of scientists of the USSR Academy of Scientists in training highly-skilled scientific cadres, through special-purpose graduate fellowships at the nation's higher educational institutions.

However, the resolution points out, there are serious shortcomings and unused capabilities in the development of cooperation between the university and the USSR Academy of Sciences. Highly qualified scientific-pedagogical cadres at

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the university are not fully utilized in research projects on the most important scientific-technical and socioeconomic problems; and far from every VUZ in the country has been enlisted to perform scientific work in accordance with the coordinated plans of the USSR Academy of Sciences. There are still few important complex research projects carried out in the VUZ's. The subject matter of the research projects carried out in accordance with economic agreements with enterprises and organizations, in a number of instances, are of a casual nature.

University personnel are inadequately enlisted to perform joint research projects on the facilities of the Academy's scientific establishments, and in particular for work on the unique installations the USSR Academy of Sciences possesses. The proven practice of establishing branch university chairs at the leading institutions of the USSR Academy of Sciences is not yet sufficiently developed. Prominent scientists of the USSR Academy of Sciences seldom take part in preparing up-to-date textbooks and educational materials, nor in the work of increasing the skills of the VUZ instructors.

In the interests of furthering the development of scientific research in the nation's higher educational institutions, and strengthening the ties between the university and the scientific establishments of the USSR Academy of Sciences, the Presidium of the USSR Academy of Sciences and the Collegium of the USSR Ministry of Higher and Secondary Special Education have resolved to approve the activity of the sectors of the Presidium of the USSR Academy of Sciences; of the departments, scientific research establishments and scientific councils on problems of the USSR Academy of Sciences; the Scientific-Technical Council and its sections; the Main Administration of Scientific Research Work, the Educational-Methodological Administration on Higher Education, the Administration for the Leading and Scientific-Pedagogical Cadres of Minvuz, USSR, and Higher Educational Institutions, for strengthening the cooperation between the USSR Academy of Sciences and the university, and to recommend that they take every measure for further expansion and perfection of this cooperation; proceeding from the tasks defined in the decree of the CPSU Central Committee and USSR Council of Ministers, "On Increasing the Effectiveness of Scientific Research Work in the Higher Educational Institutions."

It has been deemed expedient to form at the Presidium of the USSR Academy of Sciences and Minvuz, USSR, a council on ties between the USSR Academy of Sciences and the university for solving the problems concerning strengthening and perfecting the scientific and scientific-pedagogical cooperation between the VUZ's and the scientific establishments of the USSR Academy of Sciences, as well as long-term planning for training scientific cadres. The basic tasks of the council have been defined. Its leadership has been placed on Vice President of the USSR Academy of Sciences and Rector of the Moscow State University, Academician A. A. Logunov.

It has been recommended to the scientific problem councils of the USSR Academy of Sciences and to the sections of the Scientific-Technical Council of Minvuz, USSR, to constantly maintain close contact in working out coordinated plans, and defining the prospects and directions of joint scientific research projects by the Academy's scientific establishments and the VUZ's, etc.

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A request has been made to the Scientific Council of Problems of Scientific-Technical and Socioeconomic Forecasting at the Presidium of the USSR Academy of Sciences and the USSR State Committee on Science and Technology (Academician A. A. Kotel'nikov), to examine the question of more extensively enlisting the VUZ's in developing the Complex Program for Scientific-Technical Progress for the Next Twenty Years, in the interests of more completely reflecting the contribution of the university in the development of the nation's science, technology, economy, and culture.

It has been deemed expedient to conduct at joint sessions of the Presidium of the USSR Academy of Sciences and the Collegium of Minvuz, USSR, as well as those of the presidium of the union republic academies of science and the collegia of the republic Minvuz's, periodic discussions of the results of scientific research work and the prospects for development within the framework of coordinated plans of the USSR Academy of Sciences and the academies of sciences of the union republics.

It has been decided to expand the practice of concluding long-term agreements on creative cooperation between the institutes of the USSR Academy of Sciences and the VUZ's; at the same time, having provided the necessary conditions for enlisting the provincial VUZ's for scientific research; providing their research fellows long-term temporary assignments for work on the unique installations at the Academy's scientific establishments; expanding the practice of allowing students at the VUZ's and above all at the universities to complete work towards their degree at the scientific establishments of the USSR Academy of Sciences.

The Personnel Administration of the USSR Academy of Sciences, together with the Administration for Management and Scientific-Pedagogical Cadres of Minvuz, USSR, have been commissioned to work out a unified plan for VUZ instructors to do their probationary work at the scientific establishments of the USSR Academy of Sciences; and, by means of special-purpose graduate fellowships, train the scholars with the highest qualifications, for the new and the insufficiently staffed specialties.

It has been suggested that the departments of the USSR Academy of Sciences take part in improving educational plans and programs on the basis of increasing the importance of the fundamental sciences in the theoretical and professional training of specialists with a broad background; by more completely reflecting the newest achievements of science and progressive experience while training cadres for all sectors of the national economy, for science and for culture; having stipulated in the educational-methodological documentation the organization of training the cadres and rationally combining theoretical knowledge with the ability to solve practical problems.

The Council on Ties between the USSR Academy of Sciences and the University must assure more active participation by the scientific establishments and the scientists of the USSR Academy of Sciences in preparing textbooks and educational materials, and in working out educational plans and programs for the universities on the natural and social sciences.

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It has been recommended that the higher educational institutions regularly invite prominent scientists of the USSR Academy of Sciences to deliver lectures at the VUZ's to the professorial-instructor staff, to graduate students, and to the undergraduates, and also at VUZ departments for increasing their qualifications; or independent short courses on the most important achievements of modern science. It has been proposed that the departments and scientific establishments of the USSR Academy of Sciences give the VUZ's all possible assistance in these measures.

It has been decided to encourage independent participation by the personnel at the VUZ's and at the Academy's scientific establishments at the scientific conferences, meetings, seminars and symposia conducted by the USSR Academy of Sciences and Minvuz.

The department of scientific instrument manufacturing of the USSR Academy of Sciences, together with the Main Administration for Scientific Research Work of Minvuz, have been commissioned to carry out work on bringing to light completed original development of new instruments for the purpose of speeding up their manufacturing at the enterprises of the USSR Academy of Sciences and Minvuz, and transfer of parts of them for assimilation into industry.

A request has been made to the academies of science of the union republics to discuss the questions touched on in the present resolution with the republic Minvuz's. It has been deemed necessary to examine at the session of the Council on Coordination of Scientific Activities of the Academies of Science of the Union Republics the results of the aforementioned discussions and to plan measures for developing scientific research in the VUZ's of the union republics and strengthening the ties between the universities and the republic academies of sciences, taking into consideration the positive experiences in cooperation of the academies of sciences of the Ukrainian SSR, Belorussian SSR and Lithuanian SSR and the higher educational institutions of these republics.

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